CARBAPENEM AND COLISTIN RESISTANCE
A GLOBAL CHALLENGE

Rising bacterial resistance to antibiotics has become a major public health issue worldwide.

Although rarely reported a decade ago, carbapenem-resistant Gram-negative bacteria, such as *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Enterobacteriaceae*, are rapidly spreading worldwide, with the risk that they may evolve from multi-drug to pan-drug resistance.

Carbapenem resistance related to the production of a carbapenemase-type enzyme is currently the issue of most concern, since carbapenemase-producers are highly transferable.

Carbapenem antibiotics are crucial for treating the life-threatening infections caused by these highly resistant Gram-negative bacteria. They are also “antibiotics of last resort” and it is essential to maintain their clinical efficacy.

With the dissemination of multi-resistant bacteria, the use of colistin for antimicrobial therapy has increased, leading to a rise in the prevalence of colistin-resistant strains.

The emergence of a new plasmid-mediated colistin resistance mechanism *mcr-1*, described for the first time in 2015, has changed the scenario of resistance to polymyxins, due to the transferable nature of this resistance.

Early identification of carbapenemase-producers and colistin-resistant strains in both infected patients and carriers is therefore critical to prevent the spread of infection and resistance to carbapenem and polymyxin.

Diagnosis of colistin resistance and carbapenemase-producers among infected patients, but also screening of carriers, are first-line measures that contribute to:

- prevent hospital-based outbreaks, and limit spread in the community;
- facilitate rapid implementation of infection prevention and control measures, e.g. patient isolation;
- support epidemiological surveillance of the spread of carbapenemase producers at local, regional, national and global levels.
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CHROMID® COLISTIN R

CHROMID® Colistin R agar* is a selective chromogenic medium for the screening of colistin-resistant Enterobacteriaceae. The detection of colistin-resistant carriers is particularly important as colistin is considered to be a last-resort antibiotic to treat infections caused by Carbapenemase-Producing Enterobacteriaceae (CPE).

The rising spread of colistin-resistant strains is a serious threat for public health. The various mcr genes responsible for resistance to colistin have been found in both animals and people. In this context, the use of CHROMID® Colistin R medium contributes to the active surveillance of colistin-resistant strains in humans as well as in animals.

In addition to screening, CHROMID® Colistin R has been validated for the qualitative detection of resistance to colistin from isolated colonies of E. coli, K. pneumoniae and Salmonella spp., and can be used as an alternative method to Broth Microdilution, giving category agreement (S/R) for colistin.

*For more information, see: www.mybiomerieux.com
This study evaluated the performance of CHROMID® Colistin R agar (COLR) for the screening of colistin-resistant Enterobacterales. COLR specificity was assessed on 178 clinical samples: 89 rectal swabs and 89 stool samples. COLR sensitivity for the colistin resistance mechanism in high-risk patients was assessed by seeding 59 negative clinical samples that were artificially contaminated with 59 colistin-resistant Enterobacterales (of human and animal origin), including 20 mcr-1-positive strains. Within 24 hours of sample collection, rectal swabs were inoculated directly into selective enrichment broth for 4-5 hours.

The study findings demonstrated overall specificity of 100.0% and overall sensitivity of 88.1%. Results were similar for both rectal swabs and stool samples, suggesting that either type of specimen could be used for routine screening purposes.

During the specificity study, a total of 12 fresh clinical samples were confirmed to be resistant to colistin, including one mcr-1-positive E. coli, which represents an overall 6.7% prevalence of colistin resistance for fecal carriage of Enterobacterales. This chromogenic medium facilitates detection of colistin resistance carriers, allowing easy identification of targeted species based on distinct colors. It represents an affordable and accurate assay for clinical microbiology labs to screen for the colistin resistance mechanism in high-risk patients.

The study concluded that COLR is a sensitive and specific chromogenic agar to screen for colistin-resistant Enterobacterales, including those carrying the mcr-1 gene.

“The CHROMID® Colistin R agar represents a selective and specific method to perform surveillance studies to detect colistin-resistant Enterobacterales using both stool and swabs.”

**KEY POINTS**

- This study demonstrated the presence of colistin R carriage: 12 colistin-resistant isolates were isolated in fresh clinical samples, representing an overall prevalence of 6.7% for fecal carriage of Enterobacterales.
- Excellent specificity (100.0%) due to selective enrichment broth step.
- Selective and specific method to perform surveillance studies to detect colistin-resistant Enterobacterales using stool or swab samples.
This study shows that CHROMID® Colistin R is an accurate and simple alternative test to BMD giving category agreement (S/R) of 97.5% for colistin in *E. coli*, *K. pneumoniae* and *Salmonella spp*.

**KEY POINTS**

- This study shows that CHROMID® Colistin R is an accurate and simple alternative test to BMD giving category agreement (S/R) of 97.5% for colistin in *E. coli*, *K. pneumoniae* and *Salmonella spp*.
CHROMID® CARBA
CHROMID® CARBA SMART
CHROMID® OXA-48

CHROMID® CARBA agar*, CHROMID® CARBA SMART* and CHROMID® OXA-48 agar* are selective chromogenic media for the screening of Carbapenemase-Producing Enterobacteriaceae (CPE), and OXA-48 CPE, particularly KPC and NDM-1, in patients who are chronic carriers or in patients at risk.

CPE are particularly multi-resistant bacteria that are capable of causing healthcare-associated infections (HAIs) and hospital epidemics. The detection of CPE carriers is particularly important for the prevention and epidemiological monitoring of these infections. In this context, the use of CHROMID® CARBA, CHROMID® CARBA SMART and CHROMID® OXA-48 media contributes to the active surveillance of CPE.

CHROMID® CARBA agar, CHROMID® CARBA SMART and CHROMID® OXA-48 agar consist of a rich nutritive base combining different peptones. The media contain:

• a mixture of antibiotics which enable the selective growth of CPE;
• three chromogenic substrates which enable the identification of the most frequently isolated CPE.

*For more information, see: www.mybiomerieux.com
Detection of OXA-carbapenemase-producing Enterobacteriaceae with CHROMID CARBA SMART screening plate.

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To prevent the spread of Carbapenemase-Producing Enterobacteriaceae (CPE), it is essential to identify patients who are carriers. In Singapore, where this study took place, OXA-48-like carbapenemases are among the three most commonly identified carbapenemase genes. Phenotypic detection of OXA-48 CPE is challenging due to relatively weaker carbapenemase activity and MIC when compared to other carbapenemases (such as NDM and KPC, also common in Singapore).

This retrospective study was performed over a two-year period, from August 2015 to August 2017, at a tertiary hospital after it started using the CHROMID® CARBA SMART, a screening biplate that contains CHROMID® CARBA and CHROMID® OXA-48 agars. Prior studies have shown that CHROMID® OXA-48 agar improves the detection of OXA-48-like carbapenemases.

The study analyzed 5,025 CPE screening requests performed after implementation of the CHROMID® CARBA SMART. Of this number, 181 requests grew Enterobacteriaceae, of which 29 were negative for CPE. PCR performed on the remaining isolates detected 77 patients who were CPE carriers: 7 of 77 CPE carriers (9.1%) and 7 of 23 OXA-CPE carriers (30.4%) had OXA-CPE growing only on the CHROMID® OXA-48 agar. This means that without the CHROMID® OXA-48 agar, more than 30% of OXA-CPE carriers in the study would not have been detected (false negatives).

The authors concluded that the use of the CHROMID® CARBA SMART biplate may improve detection in settings with low incidence of OXA-CPE. They suggest that healthcare providers using agar-based screening methods should consider the advantage of various agars, including CHROMID® CARBA SMART. Lastly, they remarked that overall CPE incidence in Singapore is increasing and the incidence of OXA-CPE may be grossly underestimated due to a lack of effective screening methods.

“Use of the CHROMID® CARBA SMART biplate which includes the CHROMID® OXA-48 agar improved detection of OXA-CPE even in a relatively low incidence setting.”

KEY POINTS
- Using a dedicated screening plate for OXA-48 improves the detection of OXA-48 CPE carriers in low incidence OXA-48 CPE settings.
- In this study, 30.4% of OXA-CPE carriers would not have been detected without the CHROMID® OXA-48 agar (part of CHROMID® CARBA SMART biplate).

Verification of the Cepheid Xpert Carba-R assay for the detection of carbapenemase genes in bacterial isolates cultured on alternative solid culture media.

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This study was designed to evaluate the performance of the Xpert Carba-R (Cepheid) PCR assay for the detection and differentiation of five genes responsible for carbapenem resistance. Prior studies have used this PCR assay with isolates taken from the manufacturer’s recommended solid media (blood agar or MacConkey agar). However, in many clinical diagnostic laboratories this may cause a delay of up to 24 hours to confirm suspected CPE isolates. Therefore, a second aim of this study was to test whether genes could be detected equally well if the isolates were grown on solid agar media such as the CHROMID® CARBA SMART (the only chromogenic plate used in the study to validate the test performance of the PCR assay) and other media.

The results showed that applying the Xpert Carba-R Assay on isolates cultured on solid media other than those recommended by the manufacturer (CLED, CHROMID® CARBA SMART and nutrient agar slopes) produced results that were comparable to those obtained on isolates from the manufacturer’s recommended media. The performance of CHROMID® CARBA SMART was equivalent to that of the other solid media.

The authors concluded that, based on their data, there is no need to delay PCR confirmation of CPE isolates by sub-culture to the manufacturer’s recommended media. Delays in laboratory reporting could be avoided by testing isolates directly on CHROMID® CARBA SMART or other solid media.

“By testing isolates directly from any of these media [including CHROMID® CARBA SMART], delays in laboratory reporting can be avoided.”

KEY POINTS
- CHROMID® CARBA SMART is the only chromogenic plate used in the study to validate the test performance of the PCR assay, Xpert Carba-R (Cepheid).
Evaluation of Multiple Methods for the Detection of Gastrointestinal Colonization of Carbapenem-Resistant Organisms from Rectal Swabs.

Sinner PJ, Martin F, Openi B, Tamma PD, Carroll KC, Mittleman AF

Current methods for the detection of Carbapenem-Resistant Organisms (CRO) include broth enrichment, direct selective culture, chromogenic media and detection of carbapenemase genes directly from rectal swabs. The study aimed to evaluate several of these methods for screening CRO from rectal swabs and determine the prevalence of gastrointestinal colonization with CRO among high-risk inpatient populations.

Five different methods for CRO detection were evaluated: the CDC broth enrichment method using ertapenem for selection; a modified CDC broth enrichment method using ertapenem and vancomycin for selection; a direct MacConkey plate with ertapenem disk method; the CHROMID® CARBA agar plate method (new reformulated media*); the Check-Direct CPE Screen for BD MAX®. Two-hundred and thirteen frozen rectal ESwarbs were collected from high-risk inpatients in a non-outbreak setting in a US hospital. After vortexing for 5 seconds, 100 μl of ESwarb was inoculated into each of the media types and 25 μl was inoculated into a DNA sample buffer tube for the Check-Direct CPE Screen assay. All Gram-negative bacilli that grew within 27 mm of the ertapenem disk or growth on CHROMID® CARBA were identified using Matrix Assisted Laser Desorption Ionization Time-of-Flight (MALDI-TOF) mass spectrometry, and susceptibility testing was performed according to CLSI recommendations. Enterobacteriaceae resistant to one of the carbapenems tested were evaluated to identify carbapenemase production by the Carba NP test. If positive, molecular genotyping was performed with Check-MDR.

The overall prevalence of colonization was determined to be 9.4% (N=20) for CRO and 2.3% (N=5) for Carbapenemase-Producing Organisms (CPO).

In conclusion, this method comparison showed that the Direct MacConkey plate method was the most sensitive test for CRO detection (95%) while CHROMID® CARBA and Check-Direct CPE Screen were the most sensitive for CRO detection (100%; all bla KPC). All methods had a specificity of >90% for CRO detection, and for CPO detection, the specificity ranged from 85-98% (84.6-90.4% for culture-based methods only). In this study, the CDC broth enrichment methods performed poorly compared to direct inoculation methods, negating the need for the broth enrichment step.

KEY POINTS

➔ Among the culture-based methods, CHROMID® CARBA showed the best performance for screening of carbapenem-producing Enterobacteriaceae (CPE).


This state-of-the-art review covers the current status of surveillance methods for the detection of intestinal carriage of Carbapenemase-Producing Organisms (CPOs). The authors made a systematic review of all surveillance methods and give clear definitions and recommendations regarding the context of surveillance, the definition of carbapenem resistance, and classification of 8 culture-based media, confirmation reagents and molecular methods for CPO screening. In particular, the authors highlight the importance of screening for intestinal carriage for the development of infection control strategies and the effective control of infections due to CPOs. Sites that have implemented a “bundle approach” to control the spread of CPOs, including screening of carriers, have been found successful in decreasing carriage rates.

Culture-based screening methods are readily available in clinical microbiology laboratories, and chromogenic media have made culture-based screening more convenient, despite long turnaround times. Based on their analysis in this review, the authors favor the use of CHROMID® CARBA. However, if a hospital is located in a geographic area with a high incidence of BlaKPC, the clinical microbiology laboratory should strongly consider the use of Supercarba or the addition of an OXA-48-specific medium such as CHROMID® OXA-48 medium. A biplate, CHROMID® CARBA SMART, containing CHROMID® CARBA and CHROMID® OXA-48 is also available. Agar-based and colorimetric tests are generally affordable and able to detect the presence of “new and emerging” carbapenemases before they are characterized. The colorimetric Carba NP test is one of the recommended tests for confirmation of carbapenemase production in pure isolates by the CLSI and EUCAST, and can be performed in most microbiology laboratories, with no additional equipment. Agar-based procedures always require confirmatory testing to detect the type of bla gene present after a potentially resistant isolate is detected. Clinical microbiology laboratories may choose an agar-based screen with follow-up molecular testing, or a molecular method followed by culture if further investigation of the isolate is required.

This review sets out the strengths and limitations of available methods to help infection control practitioners and clinical microbiologists determine the most suitable approach for the infection control needs in their medical facility. It concludes that a proactive approach to halt the spread of carbapenemase producers is needed to prevent and control infections caused by CPOs and to protect public health.

KEY POINTS

➔ CHROMID® CARBA is the preferred culture-based screening method in this review.

➔ The Carba NP test is one of the tests recommended for confirmation of carbapenemase production in pure isolates by the CLSI and EUCAST.

➔ The CHROMID® CARBA SMART bi-plate is also mentioned in this review.
The study evaluated the hypothesis of a Carbapenemase-Producing Enterobacteriaceae (CPE) reservoir in a geriatric/chronic care population. It also compared the performance of CHROMID® OXA-48, CHROMID® CARBA agars, and a MacConkey agar after enrichment broth followed by a molecular assay, Check-Direct CPE, for the screening of CPE* to evaluate the intestinal carriage by rectal swabs.

A total of 384 rectal swabs from 3 nursing homes and one rehabilitation center were collected using Eswab devices from COPAN. An amount of 100 µL was inoculated onto each of the 3 agars: CHROMID® CARBA, CHROMID® OXA-48 and on MacConkey with a temocillin/meropenem disk. In parallel, 100 µL were inoculated into an enrichment broth with ertapenem. After incubation for 4 hours at 35°C, 100 µL were inoculated onto MacConkey. Isolates were retrieved from 261 patients, and 257 showed growth on the MacConkey agar. Two readings were performed after 24 and 48h of incubation. Identification of all colonies was performed using MALDI-TOF technology. Check-Direct CPE was performed on all Enterobacteriaceae isolates with meropenem MIC >0.5 µL/mL and/or temocillin MIC >16 µL/mL and each Eswab was analyzed by Check-Direct CPE for the detection of blaKPC, blaOXA-48, blaVIM/NDM.

Only one of the 257 included residents/patients was a true asymptomatic carrier of CPE. Growth of K. pneumoniae was observed on this patient’s rectal screening culture after 24 h on CHROMID® OXA-48 and on MacConkey with a temocillin/meropenem disk. In parallel, 100 µL were inoculated into an enrichment broth with ertapenem. After incubation for 4 hours at 35°C, 100 µL were inoculated onto MacConkey. Isolates were retrieved from 261 patients, and 257 showed growth on the MacConkey agar. Two readings were performed after 24 and 48h of incubation. Identification of all colonies was performed using MALDI-TOF technology. Check-Direct CPE was performed on all Enterobacteriaceae isolates with meropenem MIC >0.5 µL/mL and/or temocillin MIC >165 µL/mL and each Eswab was analyzed by Check-Direct CPE for the detection of blaKPC, blaOXA-48, blaVIM/NDM.

Since only one case of CPE OXA-48 was found, this survey could not confirm the presence of a CPE reservoir in nursing homes in Belgium. The specificity of the different methods was at least 97%. The use of the CHROMID® CARBA SMART bi-plate combining CHROMID® CARBA and CHROMID® OXA-48 to recover OXA-48, KPC and NDM is worthy of consideration.

“In this study’s regions [in Belgium], where OXA-48 is a problem, the use of chromogenic biplates such as CHROMID® CARBA SMART (bioMérieux), combining CHROMID® CARBA and CHROMID® OXA-48 to recover both OXA-48, KPC, and NDM is worthy of consideration.”
The RAPIDEC® CARBA NP test consists of a ready-to-use strip for the rapid detection of carbapenemase activity in Gram-negative bacteria, such as Enterobacteriaceae, P. aeruginosa and in A. baumannii, using bacteria cultured on an agar medium.

The test is based on detection of hydrolysis of the β-lactam ring of a carbapenem (imipenem). Hydrolysis acidifies the medium, changing the color of the pH indicator (phenol red solution). The color change is visible to the naked eye; no reading device is required. No color change within 2 hours indicates absence of carbapenemase-producing activity.

The RAPIDEC® CARBA NP test provides identification of carbapenem resistance in less than 2 hours (compared with 24-48 hours previously). It can be performed directly on isolated colonies grown on recommended selective or non-selective agars.

The test is recommended for rapid identification of any carbapenemase activity of Enterobacteriaceae, and specifically the forms most commonly found worldwide today: Klebsiella pneumoniae carbapenemase (KPC); New Delhi metallo-β-lactamase (NDM); Verona integron-encoded metallo-β-lactamase (VIM), imipenemase (IMP) and oxacillinase-48 (OXA-48). For example, KPC-producing bacteria can be identified in less than 30 minutes.

The test has excellent sensitivity and specificity and enables any laboratory to rapidly implement its own screening program for carbapenemase-producing bacteria. The test does not require any specific equipment or additional technology.

For more information, see: www.mybiomerieux.com
The MALDI-TOF MS test is commonly used for the detection of Carbapenemase-Producing Enterobacteriaceae (CPE) from cultured colonies. Different teams have developed in-house techniques that vary depending on incubation type, time of carbapenem and type of mass spectrometry used.

This study was designed to compare the performance of different techniques for the identification of carbapenemase-producing bacteria in clinical microbiology laboratories. The authors compared the MBT STAR®-Carba IVD Kit, a commercially available CE-IVD MALDI-TOF-based test, with 2 in-house assays performed on the most commonly-used mass spectrometers. The in-house MALDI-TOF-based assays were tested by microbiology labs at the University Hospital of Brest and at the Colmar Civil Hospitals. The performances of the 3 MALDI-TOF-based methods were compared to that of RAPIDEC® CARBA NP, a colormetric assay for the early detection of carbapenem-hydrolyzing activity in Gram-negative bacteria.

To make a comparative assessment, the participating centers blindly tested a collection of 175 bacterial isolates (120 carbapenemase producers and 55 non-carbapenemase producers). Previously, all strains had been characterized for their β-lactamase content at a molecular level. The CPEs were isolated from various clinical samples (blood cultures, urine, sputum, etc.) and from a variety of countries worldwide. The results of the 3 MALDI-TOF techniques were compared to those obtained using the RAPIDEC® CARBA NP test.

The findings showed that for the 3 MALDI-TOF techniques, sensitivities ranged from 95% to 100% and specificities from 98.2% to 100%. By comparison, RAPIDEC® CARBA NP had 99.2% sensitivity and 100% specificity. As regards workflows, the MALDI-TOF techniques resulted in turnarounds times of less than 1.5 h but sample preparation was faster with RAPIDEC® CARBA NP than with the other methods.

In conclusion, the results of this comparative study showed excellent sensitivity and specificity for RAPIDEC® CARBA NP, which performed better than the 3 mass spectrometry methods included in the evaluation.

“The three MALDI-TOF techniques possess sensitivities ranging from 95% to 100% and specificities from 98.2% to 100% compared with 99.2% and 100%, respectively, for the RAPIDEC® CARBA NP.”
The timely identification of Carbapenem-Producing Enterobacteriaceae (CPE) is critical in preventing their spread in healthcare settings. This comprehensive study evaluated the accuracy of 11 different phenotypic assays for the detection of CPE.

A panel of 236 Carbapenem-Resistant Enterobacteriaceae (CRE) isolates from two different cohorts were tested. These included 191 retrospective isolates (122 Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE) and 69 non-CP-CRE) and 45 prospective clinical isolates (15 CP-CRE and 30 non-CP-CRE). All isolates were characterized using molecular testing. Eleven phenotypic carbapenemase detection methods were evaluated including both colorimetric assays and growth-based assays.

In the retrospective study, RAPIDEC® CARBA NP had the highest sensitivity (98%) for detection of CPE among the commercial chromogenic assays. It outperformed both the Neo-Rapid Carb Screen® (89% sensitivity) and Rapid CARB Blue Screen® kits (89% sensitivity). All three tests had a specificity of ≥99%. The sensitivity of detecting OXA-48 types ranged from 40–100%. The performance of the growth-based methods varied depending on the type of carbapenemase present. For the overall detection of carbapenemases, the sensitivity was 91% for the Modified Hodge Test (MHT) and 96% for the Manual Carba Blue test. The other carbapenemase detection assays had a specificity of ≥99%.

In the prospective study, RAPIDEC CARBA NP had a sensitivity of 100% compared to 67% for the Rapid CARB Blue Screen®. The manual Carba NP, the MHT, and the mCIM (modified carbapenem inactivation method) also performed with a sensitivity of 100%. The specificity of the tests ranged from 53% for the Manual Blue Carba to 100% for the Rapid CARB Blue Screen and mCIM assays.

The study concluded the mCIM may be a practical assay for laboratories due to the high sensitivity and specificity and the low cost per test. However, results take approximately 24 hours. The RAPIDEC CARBA NP has all the reagents and supplies required to perform the test included in the kit with same-day results available in approximately 3 hours.

"For same day results, the RAPIDEC CARBA NP performed the best among the rapid colorimetric assays and is available as a ready to use kit."

**KEY POINTS**

- The RAPIDEC® CARBA NP is ready-to-use and provides same-day results in around 3 hours.
- Among the commercial chromogenic assays, RAPIDEC® CARBA NP demonstrated the highest sensitivity (98%) for detection of CPE, outperforming both Neo-Rapid Carb Screen® and Rapid CARB Blue Screen®.
- RAPIDEC® CARBA NP accurately distinguished mucoid and non-mucoid isolates.

The objective of the study was to evaluate the RAPIDEC® CARBA NP, a colorimetric test for rapid detection of carbapenemases, at two sites: Karolinska University Laboratory and Public Health England’s national reference laboratory.

A panel of 138 bacterial isolates previously characterized as positive for class A, B and/or D carbapenemase genes and 138 non-carbapenemase producers were tested with RAPIDEC® CARBA NP. Two carbapenemase-producing isolates carried both NDM and OXA-48-like genes. Molecular detection of the expected carbapenemase gene(s) was used as the reference method, and was performed by conventional and real-time PCR in-house assays.

RAPIDEC® CARBA NP detected 135 of 138 carbapenemase producers; 1 OXA-48-producing Klebsiella pneumoniae and 2 Acinetobacter baumannii producing OXA-23 and OXA-24 were not detected. Among 'negative' controls, 135 of 138 isolates were negative by RAPIDEC® CARBA NP. The exceptions were 1 Klebsiella oxytoca, which was later found to produce GES-5 carbapenemase, 1 Pseudomonas aeruginosa with OprD loss and increased efflux, and 1 Enterobacter cloacae with impermeability. When numbers were adjusted for the GES-5 producer, the overall sensitivity of the RAPIDEC® CARBA NP test was 97.8% and its specificity was 98.5%.

This study concluded that the RAPIDEC® CARBA NP test is an easy-to-use rapid test, taking <2.5 h for the detection of carbapenemase production and does not require specific equipment. It is a simple, relatively inexpensive method, making it feasible to be carried out by rather inexperienced technicians and in medium-income settings.

"The [RAPIDEC® CARBA NP] assay took less than two and a half hours to carry out, was user-friendly, and had a high overall performance, making it an attractive option for clinical laboratories."

**KEY POINTS**

- The RAPIDEC® CARBA NP is a simple and rapid test, requiring no specific equipment.
- The method showed very good performance (sensitivity: Se 97.8% and specificity: 98.5%).
- With a <2.5 hour turnaround time, the test could play an important role in preventing the spread of healthcare-associated infection (HAI) outbreaks caused by carbapenemase-producing Gram-negative bacteria, by leading to more rapid prevention and control measures.
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